07-29-2016

Twohig, Patrick ~ Oral History Interview

Joshua Wrigley

Recommended Citation

Twohig, Patrick Interview by Joshua Wrigley. *Voices from the Science Centers*. Voices from the Fisheries, NMFS, NOAA. 29 July 2016.

This oral history was produced in 2016 as part of the *Voices from the Science Centers Oral History Initiative* conducted by *Voices from the Fisheries* with funding by the NMFS Office of Science and Technology.

Voices from the Fisheries
166 Water Street
Woods Hole, MA 02543

Interview with Patrick Twohig by Joshua Wrigley
Summary Sheet and Transcript

Interviewee
Twohig, Patrick

Interviewer
Wrigley, Joshua

Date
July 29, 2016

Place
Northeast Fisheries Science Center
Falmouth, MA

ID Number
VFF_WH_PT_001

Use Restrictions

Biographical Note
Patrick Twohig was born on May 12, 1934 in Providence, Rhode Island. After graduating high school in Providence, he joined the Navy and was a ship and submarine inspector for the Navy. He began working for the U.S. Bureau of Commercial Fisheries in 1963, and continued on at the Northeast Fisheries Science Center, working at both the Woods Hole and Gloucester labs in Exploratory Fisheries. Mr. Twohig retired from the Northeast Fisheries Science Center and currently splits his time between Florida and New England.

Scope and Content Note
Interview contains discussion of: Naval ship inspections, NOAA research vessel *Albatross IV*, repairing and developing fisheries gear, developing fishing gear with fishermen, loran-A, loran-C, offshore lobster pots, longlining technology, evolution of trawl nets, offshore clam dredge, net rollers, design of the *Albatross IV*, changes at the Woods Hole facility, building the *Delaware II* research vessel, closing of the Gloucester lab, NOAA research vessel the *Glory of Michelle.*

This interview contains a rich description of Patrick Twohig's time developing gear for NOAA at the Northeast Fisheries Science Center in Woods Hole and Gloucester. He recounts various experiences developing a variety of tools for scientists at the Center to use in gathering data.

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Joshua Wrigley (JW): Well let me, uh, let me just introduce the interview here on, on tape, and then we can sort of get into, get into talking about, I guess, your start in the Navy in 1963, was it?

Patrick Twohig (PT): No, it was, no I, you're right, I was an inspector for the Navy--

JW: Okay.

PT: --up at Portsmouth Naval Shipyard--

JW: Yeah.

PT: --um, and, you know, they're nuclear vessels, or submarines...

JW: Right, right.

PT: ...so when you're inspection, they'll send you anyplace. It doesn't make a difference if you're electronics or what. They're, if they need you, you're going to whatever--

JW: Wherever, yeah.

PT: --department they send you to. So it wasn't that healthy, plus I took a few hits, you know, so then I said, this is not the best place to be. And they were just getting, they just got the *Albatross* in here, they got the *Albatross*...

JW: Right, right.

PT: November, Thanksgiving morning, and I come here in January, and the *Albatross*, nothing really worked on it. There was, I mean, they got it out of the shipyard brand new, but I mean, it's like any vessel; if it really hasn't been... If you don't have inspectors, there all the time, the shipyard's going to beat you.

JW: Well, let me, let me just read this short--

PT: Okay.

JW: --piece here and then we'll, we'll dive back in. This in an interview for Voices from the Fisheries as part of the Voices from the Science Centers Project funded by NOAA's Office of Science and Technology. I'm Josh Wrigley, Project Manager of Voices from the Fisheries, and today I'm speaking with Patrick Twohig, at 15 Carlson Lane, which is where the Social Sciences Branch of the NEFSC is located. The date is July 29, 2016, and it's about 1:15 right now, I would say. Um, so, let's start from the very beginning, Pat. When were you born?

PT: Uh, May 12, 1934, Providence, Rhode Island.

JW: And did you grow up in Providence?

PT: Yes, I did. I went to [unintelligible] High School, and then in the service, and school after the service. I got married as quick as I got out of the service. And then on to school.

JW: What did you go to school for?

PT: Uh, well, I went to work for United Aircraft and they sent me to school. It was, I went five years for them, you either went to, it wasn't Harvard University, it was College then, but they had their own school right there. And I got through and I went to work for the, for the Navy then.

JW: So as, as a vessel inspector for the Navy, what did that entail in terms of duties and responsibilities?

PT: Well, the responsibilities were high. What, the way the Navy works is, it was a Naval shipyard, the Navy builds the vessels and inspection is separate from the shipyard and they're separate from the Navy, although you're a government employee. And you make sure that the system is build according to specifications, and you buy it from the shipyard and in turn, you sell it to the Navy. That's the way it works. And I had the SUBROC system, which you weren't even allowed to write the name down until the *Thresher* sank and a week later, *Life Magazine* had the, on the front page, about how important the vessel was with the SUBROC system.

JW: And the *Thresher* sank in April of 1963, right?

PT: Right. So I was here.

JW: Yeah. Had you, had you been aboard, working on it?

PT: Oh yeah, I worked on it quite often. Of course, they had like, we had the 602 boat, which was a Polaris boat; the *Thresher* was an attack vessel. And we had the *Abraham Lincoln*, which was a Polaris vessel, and we had the 569, which was the first hull, like you see in the submarine, but it was a diesel vessel. We worked on all of them. Whatever, whatever had to be done, whatever the job called for that day, you were on that particular vessel. And you might be working on any system. But you had a, you have a sheet that tells you what you're going to be doing, okay, and you've got to use a lot of common sense on, sometimes the way things work. It might only be a partial job, you go on only inspection, it starts right from the first day they start working. You make sure that that work is performed that day because a lot of times things get covered up there, so you're down there all the time with them, just with test memos. And planning and estimating, or writes out the test memos. So, one big clump, but if you separate it all out it works well.

JW: And when you, when you said that the hulls of the boats were, like what we have now, you mean, similar I guess to the--

PT: Right, right.

JW: --vessels that you see at Groton when you're--

PT: Yeah, high speed design, yeah, right.

JW: --taking the ferry out.

PT: And see the big thing with submarines is no noise. Everything has to be as quiet as can be. That's where we were well ahead of the other nations. We have listening devices in the oceans, the government has. And each submarine has a signature to it; it makes a certain noise and most of the noise comes from the props. And we had, I mean, the government had designed high-speed props that were very quiet, so we were, we were well ahead of everybody else.

JW: When did they develop that technology?

PT: It was on those vessels, that was in, uh, '59, '60, '61, yeah.

JW: Okay, so going back a ways.

PT: Yeah.

JW: So when, what were you doing on the *Thresher* when, before...

PT: I had the SUBROC system. That was my system, and that SUBROC system is, attack vessels are so quick underwater, if you fire a torpedo, they can evade the torpedo. But the SUBROC system, the torpedo left, went up in the air, and then come down on top of them there, so they had no way to know where the torpedo was coming down. You program where you think they're going, and you lay one of them on top of them.

JW: So how do you spell SUBROC? Is that s-u-b...

PT: S-U-B, Sub Rocket.

JW: Okay. Okay. So then how did, how did you come to be working for the National Marine Fisheries, well, I guess at that point--

PT: Well...

JW: --the Bureau of Commercial Fisheries--

PT: Right, yeah, I was, I was looking...

JW: --after your--

PT: I was going to go with the FAA, and then a fellow who worked at the Fisheries also before worked in the Navy yard. I think he was just a, uh, electronics technician, and he called me and he said, down at Woods Hole they got a new vessel and it's not working, you know. He said it'd be an ideal place to go, and so I, um, I don't know how I got the application, I can't remember that, I just filled it out and they called me three days later and said can you come down for an interview, and I said yes, come down, and looked the place over, and it's good. Work sounds great and it's exactly what I do.

JW: Where had you been living at that time?

PT: Uh, in Dover, New Hampshire, which is ten miles west of Portsmouth Naval Shipyard. That's where my wife was from.

JW: Okay.

PT: That's why we moved back from Hartford to, uh, to Dover. She didn't like living in Connecticut. I was satisfied, but, when you get married you, you have to come to, come to an agreement.

JW: Compromise.

PT: Yeah.

JW: So when was it that you began working for the Bureau for Commercial Fisheries?

PT: 1963, when I came here.

JW: And when you'd received this initial report that the, uh, systems aboard the *Albatross IV* were malfunctioning, what, what were your first, what were the first things that you did after assuming that job?

PT: Oh, everything, everything. The radars, the Lorans, the RDS, all the acoustic equipment, you know, but we got it working, it was no big deal, you just have to plod away and it worked quite well for us then. But we were from, time I arrived, we didn't, we didn't uh, go to sea until April, I think, was our first trip. The vessel just sat there. They had a lot of other problems, they had machinery problems, winch problems, everything. But everything worked out good for it, yeah. That lasted here a long time. A comfortable vessel.

JW: Did, uh, did you sail on it--

PT: Oh yeah.

JW: --when it went to sea?

PT: Yup. I, uh, I wasn't really assigned to the vessel; I worked for the lab. But yes, whatever, whatever wasn't working, or whatever needed to be done, and if it looked like it had to be done at sea and that the piece wasn't working, or would quit, yes, I did work there. I don't mind, I never, I never really cared for sea, but it never bothered me. I never was seasick or anything. So everything worked out well. And we were gone for like two weeks at a time, 14 days, and...

JW: What were some of the common mechanical problems that you'd run into aboard the *Albatross* when...

PT: Oh, I didn't, mechanical problems were, they belonged to the ship's engineers and that piece there. I did electronics and the winches were below deck, the winch operators were above, so first of all you had TV cameras to take a look at the winches when they were moving, and the pilothouse could not see the deck, so we had cameras shining down on the deck and this displays in the pilot house. The hydroacoustics, of course, were a mess. They, the shipyard didn't do a great job installing them so we, we just had to redo a lot of things or…everything worked out great for us though. I mean, we didn't, we didn't really have any problems. We never, I don't remember canceling a trip or anything for electronics problems. Just kept it going. And we had backups just about for everything. Plus you had the scientific equipment that went onboard like the sonarometers, the oxygen detectors, um, one of them had PGR - position graphic recorders, that was a beauty. The, um, whatever they had for scientific equipment. The SCDs, CTDs, whatever they had for scientific equipment we, we serviced. Or we ran, either one. Most of the time we ran them for there.

JW: Would they often require repairs at sea?

PT: Oh yes. Things, when you put things in water and it's going, you, you don't know what's going to happen. We had underwater television and everything, so. We were developing hydroacoustic programs at the time, so, and I had studied all of that so I didn't have any problem with it there.

JW: Yeah, Linda had mentioned, actually, that you worked on developing an underwater camera--

PT: Oh yeah, well, yeah, we...

JW: --in the 1950s.

PT: No, that was, Jim, Jim Crossen, he was ahead of me.

JW: Okay, okay.

PT: I mean, have you interviewed Jim yet?

JW: No, not yet.

PT: Okay, all right. Um, oh yeah, we did it, both, ourselves there, and we got everything working, it wasn't much, just, anything you put in the water, I mean it's, if it's got the slightest little leak or the cable's damaged or anything, you've got problems with it there. It's exaggerated. Plus the vessel's always moving so, if you get a movement on a piece of equipment sometimes it's, doesn't act too well. I used to run the CTDs, SCDs for them there. And--

JW: What did that stand for?

PT: --any of the lab equipment. What?

JW: What did that stand for?

PT: Oh, SCD is Salinity Conductivity and Temperature. What they do is, you put down this in the water and you have bottles on it, and you remotely control, you want a water sample at that particular depth, but we also had, part of it is we're recording onboard, um, we're recording the salinity, the conductivity, and the temperature. And the oxygen, dissolved oxygen. That's just one of the instruments that we, you know, we had. Also the data logger, I brought the data logger; we developed a data logger and I got a contract with NASA and they were here for, oh, a year, while we developed a data logger, and we recorded every, every reading on the vessel, we recorded, I mean, automatically. And took us awhile to develop it there.

JW: In what year was it introduced finally?

PT: Uh, let's see. I did that when I come back in '70, so I'll say we finally got done like in '73, '74. But then we found out that the, you could be advanced enough, but then the data people have to take the data and they have to interpret the data and sometimes it was tough, you know, to, because computers were just starting to be used then there.

JW: So was this data not only temperature and salinity recordings, but also--

PT: Oh, everything, all the ship parameters.

JW: --growth, and, uh--

PT: Ship parameters.

JW: --age, stomach contents--

PT: --the speed, the water, surface water temperature we recorded.

JW: Okay.

PT: Wind speed, vessel speed, vessel direction, depth, we recorded all that there. Position. Um, everything was recorded. We put sensors on because we didn't have any sensors and we developed the sensors, myself and NASA. It worked out great for us there.

JW: How did the sensors work?

PT: Well, how did the sensors work? What you do is, you take an electronic reading off of, we'll say, like, we'll take wind for example, okay? You've got wind speed, that's propeller, and propeller generates electrical signal down to the visual readout, okay? They were analog at the time, they weren't digital. So then we'd record the voltage that comes down and we have a, a sliding scale, which the voltage equals a certain wind speed. And the direction is just a vane and we take the direction and we record that. Everything's recorded automatically; the depth, we record that automatically, it's just taking the signal off the, uh, whatever you get for a readout on the depth. If it's a digital readout or an analog readout, we could record that and then we have a graph that gives us exactly that reading, what the depth or the speed was there. Um, the amount of trawl wire that's out, we recorded. The amount of wire that's out for any instrument, the meter blocks give us, give us that. It recorded everything that was going on, everything that we could record, we recorded. A lot of the times they never even bothered using it, they didn't need it, they already had a, somebody writing down manually. But we could compare our readings against theirs all the time.

JW: And so, was, was it all recorded as analog printouts then?

PT: Uh, no, everything was recorded, the analog is automatically changed to digital.

JW: Okay.

PT: We record, yeah, okay, yeah, definitely. Because analog is, I'm, I'm an analog man and it's tough to explain to people that it's much easier to take that signal and process it through a digital reading.

JW: So in 1970, you had mentioned before that you were then transferred up to Gloucester.

PT: No, I went to Gloucester in '67, no, '68, or, it was three years--

JW: Oh, no, in '70 you came back to Woods Hole.

PT: --I had three years in Gloucester. Right, yeah, I came back to Woods Hole, right. They closed the Gloucester lab. In fact, I was going to leave, I was going with the FAA, and Dr. Edwards called me and says, you're coming back to Woods Hole. He was the Director at the time.

JW: So in '67 when you had gone to Gloucester though, what were you doing there?

PT: Gear research. They had, that was the gear research base. And, um, it was electronics again, same thing. Exactly, it's always the same job. It just was, um, it was called a gear, a gear research lab, but we did the same work.

JW: Working on data recording equipment and...

PT: Yes. Yup. And hydroacoustics and, we developed, like, also gear like, first offshore deep lobster pots, we developed the strings going down to the canyons, Hudson, oceanographic and hydrographic, all of those canyons we went to, and we had the first, you had to have, when we set a string, we'd set a string of eight or ten pots on a string, and then we had recording devices in case we lost one, which we did, you know, and also the, the lights of the navigation that we had on our buoys there. All of that, I mean, whatever, whatever it took for us to complete the job. Someone would say, we'd like this. You'd say, okay, we can do that. Or, if not, we'll find out if we can do it.

JW: What was the intent behind the development of the offshore lobster gear?

PT: Another fishing, another fisheries.

JW: Just to open up the offshore--

PT: Yup.

JW: --fishery.

PT: Right, yeah. And they, it worked out quite well for us there. We did the long lines for tuna, shark, swordfish. We, we did that. A lot of net development there, of measuring the nets themselves when they're in water, the openings.

JW: Measuring the mesh?

PT: Uh, the mesh, no, we didn't, uh, all they had was a mechanical device that measured the nets, just a V, and they put the mechanical vice in and the two pieces of twine, the area between them, that's what you're measuring there. But no, we developed different nets there. And different types of nets.

JW: Were these experimental designs?

PT: Some were and some were taken and just modifying what they, what they had. And then we would measure the opening, the parameters of that, as it was being towed, for

different speeds, different depths, and that was the most important part there. Because if you know the area that you're sampling, okay, then you know the amount of biomass that you're collecting. You know, I mean, you take a look at the, in the net, and you can tell the population usually, and that's what, that's what we were doing.

JW: So what were, what were the modifications with the nets specifically that you were working on?

PT: Oh, they might add extra floats, cans, you know, we called, extra floats for an opening, or you might--

JW: To make it higher.

PT: --uh, right. And you might use different sets of doors to spread the net, net out, or different lengths of wire between the doors, and, there's a lot that goes into that there. And that knowledge was gained from the, actually fishermen themselves there, you know, and you'd, you'd take what they'd tell you, and then you'd go out and try it and see if what they said was true. And many times it was true. And they did it to just repeating the thing over and over and over again, and we used transducers on the nets to measure the, the actually the parameters of the nets, under certain conditions.

JW: Was there a specific goal in place as to--

PT: Oh yeah.

JW: --what, what these, uh, modifications were trying to achieve?

PT: Well the, yeah, you just want to know what the openings, of, depends on the amount of wire you put out, like if you're in really deep water you'd only use two to one, or two and a half to one for wire issue versus depth. Or if you're in shallow water you might go five to one, to get the same opening, you know, so. All of that, and you record all of that, and you put it down, and then they know exactly what's happening and they know the area they're sampling and for the amount of time. And when the net is staying on the bottom, if you go too, too fast, the net raises off the bottom. You go too slow the net will collapse. So you keep all that data and that's, that's your Bible. That's what you go by.

JW: And the nets were then used aboard the *Albatross IV*?

PT: Oh definitely, that's what, that's what we were doing because they're the ones who really are sampling everything. Or *Delaware*, or the *Oregon*, or whatever vessel the government was using for sampling. Plus the fishermen also wanted to know, also.

JW: Right. So that they can be aware of how the--

PT: Right, oh yeah.

JW: --how the sampling takes place and under what conditions.

PT: Right. And we got along well with them. That's the big thing is, between the fishermen always, they're out to catch fish, that's their livelihood, you know, and if you tell them, oh, you can't fish this area or something, it's, you know, they, they have a lot of problems with, they have a lot of problems with the government, you know. But we got along great with them we just, you know, we were, we were working with them, you know. I would go out on fishing vessels and measure their, measure their nets for them there.

JW: Where were most of the fishermen from? Were these just Gloucester fishermen--

PT: Oh, Gloucester--

JW: .--that you were working with?

PT: --Gloucester, Portland, um, all the way down to Atlantic City or, you just, throw your stuff on a truck and take it down, put it aboard the vessel and then we'd go out for a day or two to test everything, see what, and they were, they'd say oh, okay, they usually agreed, okay, yeah, that's it, you know, that's good, you know, that's what we were looking for.

JW: How did you find fishermen who would be willing to participate in collaborative--

PT: A lot of them, a lot of them--

JW: --projects like this?

PT: --the word would get around, just through the grapevine, and they'd hear about us and you'd be down in Point Judith or, you know, and we went a lot of different places and nobody ever complained about it. They used to ask for us there. And they'd tell their buddies, you know, like when we developed Loran, Loran-C especially. We, when we first went on board, we, uh, we had Loran-A which is just an analog signal and you line up two pulses, um, and that gave you, you know, then that gave you the time delay between the both of them, the time delay is, you know, the three stations, and you can tell where you are on the charts, the lines, have you ever seen the Loran-A or Loran-C?

JW: No, I've heard of it in other oral histories, but...

PT: There's lines, there's lines on the chart, they're time lines.

JW: Okay.

PT: Time difference lines, yeah. And they are lines across the whole chart so you go to the place where that timeline is, and you've got another timeline coming at you, it's two stations, so then that puts you on a XY, bam, okay so then, supposedly you know where you are. Well, loran-A was not very accurate, you know. When it was--

JW: When at that been developed? Was that part of the--

PT: That was developed--

JW: --did that come out of the second World War?

PT: --during the second World War.

JW: Okay?

PT: Okay? And it was, it was highly classified during the second World War. And, um, then Loran-C was developed during the Korean War, but it really wasn't used that much, but it's a lot more accurate. It's ten times as accurate. And, um, same type of lines that are drawn, but eventually everything, we did away with the oscilloscopes and everything, look at the lines, everything was come to a digital readout which made it much, much easier. Um, you had two, two readouts, you know, two different ones, so you just went to each spot on the, on the chart, and that's where you were. The, then I took, see when I worked for the Navy, when a submarine goes down, okay, they have no way of telling where they are; they use accelerometers, um, signel system, that's an internal navigation system. They might be down for two months before they even come near the surface. And so, accelerometers senses motion, okay, you were the master and two slaves and that tells you where you are, although you pinpoint your position when you're on the surface. And usually you did that with Loran-C, that would give you a pinpoint position. And the rest of the time, once you went down, that was it. These accelerometers you relied on down there. That's SINS.

JW: What made the Loran-C so much more effective or accurate than Loran-A?

PT: Different frequencies, a different system of operation. It went to a digital system. So the first times we took it, there was a company here in Massachusetts, EBSCO Corporation, and they had the government contract for, in Vietnam, the forward guys would be the troops. They would be the guys that would direct the fire. And what they'd do is they'd have to know exactly where they are and then they can pick out a spot, just draw it on the chart, that's it there--

JW: For directing artillery fire?

PT: --yes, okay? But it's just a small man pack, that's all was, just a small man pack. Of course, Loran-C, it's so much more accurate, it's ten times more accurate than, than Loran-A. So what I did was I borrowed, they let me borrow, they were classified, but they let me borrow a few Lorans, just little man packs, and at the time there was only two Loran-C stations, one was New York Airport for the helicopter service and everything, and the other one, I can't remember where the other one was, and they weren't really powerful stations. But we went to Bermuda on the *Delaware* and we used that Loran-C, and we hit that island bam on, and when they saw that, they were convinced, so I saw a company right down in Providence, it was Malichias was the fellow's name, and he was an electronic engineer and he had, I can't remember the name of the company, and I, EBSCO Corporation was only interested in, could they use it on commercial vessels other than the military. So I showed them what we did and everything, and they started producing them, and they said what do you think the cost should be? And I said, well you can't go with $3,000 because they won't spend it, that much money, and they did, they produced the first ones, and the Malichias produced

automatic lock-on which was really good, you know. And that took off like a son of a gun, that, that's what...

JW: And they were selling to the commercial fishing industry then?

PT: Yes, it's all, rec, every, every vessel...

JW: Oh, and to recreational boaters.

PT: Oh, yeah.

JW: Everyone.

PT: And for a long while that was it, and then SATNAV came in there, and, you know, that blows everything away, that's like, you know, like your phone or whatever you've got in your car, or anything, it's, it's accurate as can be, it tells you, okay, now you've reached so-and-so, turn right. [laughs]

JW: The GPS.

PT: Oh, yeah, GPS, you can't beat it, you know.

JW: Now when you mentioned that there were only two Loran-C stations...

PT: That's when we did it. The government had their own, but the charts were, they were classified charts. I can't tell you how I got one of those charts, okay. That's how we, we, we picked it up there. Um, I gave it back to them when they asked me for it back. [laughs] But we knew what--

JW: What did it mean though, that there were only two stations though--

PT: Two--

JW: --for the--

PT: --two commercial stations just for--

JW: Okay, so they were broadcasting a frequency then, I guess?

PT: Yes, they were, they were broadcasting a Loran-C signal, okay, and we picked them up and we took them a long way, then we switched over to the military system which is, which is a lot more accurate also. And then they, the commercial people started building stations that was great. And it carried us for quite a few years, fifteen, twenty years we used Loran-C.

JW: Um,

PT: But I worked in all the facets of, you know, whether it be hydroacoustics or, um, navigation or whatever it was, it was my training.

JW: Going back to the, the lobster traps that you were talking about then,

PT: Right.

JW: Um, what sort of went into the development of the, of this offshore gear?

PT: Okay.

JW: Who else worked on that project?

PT: Well, the Gloucester lab worked on that project. Everybody in the lab worked on it. And what it was, is you just can't put out a single pot in deep water, I mean, that's, it takes awhile to pull back one pot. So you put out a string of ten pots, or fifteen pots, okay, and you have a buoy maybe on two ends, we used, two ends because, we're tied and things break all the time but we had it so, on the forward pot of the vessel, they'd pull the pots up. The pots would go down a conveyor belt and they'd take out whatever was in the pots, and then assemble pots and put them over the side on the, on the aft end of the vessel. It worked out great for us. So that's when the offshore lobster started, the people.

JW: Uh, during what years were you working on the development of that gear?

PT: That was... '68, '69, '70.

JW: And what was the impetus for, um, for--

PT: Developing other fisheries.

JW: Right, right, but was it industry money that was funding it, or was it a, was the government interested in--

PT: No, the government, the government, they were looking for--

JW: --in developing it?

PT: Right, yes. We were exploratory fish, that was it, you know, gear-based exploratory fish, so you're always looking for something else, something new, you know, like the long lines. We'd go long lining for swordfish, so.

JW: So in your, your division, you were, you were tasked with developing methods for expanding--

PT: Right.

JW: --fisheries, and--

PT: Yup.

JW: --making them more effective, okay. That's what I was trying to figure out.

PT: Right, yeah. Well that's, the difference between the biological lab and an exploratory lab, that was the difference, you know. These people are looking for different methods and these are looking at parameters of the ocean and everything else that, you know. Any science.

JW: Who else was working with you on that team?

PT: Uh, the team was, actually, Ernie McRae, he was the Assistant Director. Keith Smith was the Director. Um, the, Bob Ruth was a gear man, and Phil Parker was one of the biologists. That's it. Uh, oh, and we had, we had a fellow who was the maintenance guy, but he did all the welding for us and everything, and made the pots, first deep-water pots we had, much bigger than this table here. Um...

JW: What was his name?

PT: Uh, Bill Musce. M-u-s-c-e, I think it is, yeah. They were very good. Every one of them were perfect. You couldn't ask for a nicer group to work with. And they'd go out of their way and they, like for long lining, was Peter Wilson, every, every project we did, it was somebody else there and they'd come up and they'd say, should we try this, you know, or can we do this, or, how do we do this. They were all, you know, had questions, so, you'd sit down and you'd think for awhile and you'd come up and say, yeah, I think we can, you know. Let me, let me see if I can buy some stuff there, or we can manufacture some stuff there. Call a manufacturer's rep and tell them, this is what we want, you know. And they'd come up with it.

JW: What were some of the other problems that people would present you with, or questions for, you know, what, what could be done technologically?

PT: Just about anything. If it didn't work, or they had an idea, um, like, we'll say the, um, fecundity just, if you take the, um, like counting fish eggs, okay? Well, that's a son of a gun there, you know? The, so, what you do is you run, first of all you've got to separate the eggs because it's a, a mucus type of thing there. And I remember I was playing, we used to play bridge here, and I was, I was only here for like six months at the time, and, like I said, Bob Edwards was the Director, and we used to all play bridge together at lunchtime. And, um, he was talking about, he says, jeez, that, um, fecundity project is not going to go, they can't separate the eggs, you know. I said, why don't they use an ultrasonic tag. He says, what do you mean? I says, an ultrasonic tag, it's just a transducer inside of the tag, or any kind of a medium in it, and it vibrates sound waves and it separates everything. Like if you want to clean your pen right there, or, you'd put in the tag. He says, where do they make them? I says, down in Branson. Where's Branson? I said, down, southern Connecticut, right on the New York line. And this was in the wintertime, so he says, can you go down and get one? I said yeah, well, I mean, we used their tags before, you know? And I worked on hydroacoustics, it was just a transducer, so I called a guy from Branson, I says, you think we can, um, I can pick up a tag and we'll try it and then if it works we'll buy it. So he says, go down and get it. I said, now? He said, yeah. So I go down to, he gives me a purchase order number, I don't know what it was now, so I drive down to Branson and I'm coming back and it's a snowstorm. I have

to stop in Rhode Island and go to a motel, I couldn't go any farther. So I come back and it's like 11:00 in the morning when I arrived back here, and I, I give him the tag, oh Bob Livingston was the fellow that was the biologist in charge of it there, he says, oh we'll try this. It worked, you know. And they had the eggs. Crossen took care of the simulations , all it is the light beam going every time a light bulb makes a bip you count the bips and then you know how many eggs in that particular ovaries. So the, he's sitting there playing cards. So I says, I thought you were going to New York, yesterday afternoon. He says, oh, no, it was snowing too bad to go to New York. I said you son of a gun, I drive down there and you're sitting there playing cards. [laughs] Well, I mean, he wasn't playing cards, you know, but I mean it was, that was a time he was, I walked in when they were playing cards. He had a meeting down in Washington, wasn't going because it was, the weather was bad.

But that's one of the things, yeah it's, any idea you have like that, you know, that, um, because you'd been around, you know, and I worked for United Aircraft for, you know, five years, but I wasn't in school. I was at one of their plants, so. You know, the Pratt Whitney, Sikorsky, Hampstead, any of those plants, they just send you there for three months at a whack. And I learned a tremendous amount there.

JW: Was this when you just got out of the service?

PT: Yes, I did, yeah, I went directly to them, and they paid for everything, thank God. And I, I didn't want to leave but... They had a strike and it wasn't a nice place to work. Um, the, uh, after the strike, but see I worked for the company, so they expected us to go into work. And picket lines aren't the best things to, but you were, I was only a kid at the time, really. Well, no, I was 23, 24, maybe, no, I was older, probably... I mean I was 23 when I got out, so I didn't leave there till five years later, so I was 28, I think, or 27 when I left there. But they had the strike towards the end and if you worked for the company you do what they say. You're not a union member or anything. You're not, uh, so. And then when they had the walk-off, the people walked off, and of course a lot of the machines were then just converting over to digital, like the lathes or manatrols or whatever. So I, uh, we have to go around and shut off the machines and, you know, I mean, and Pratt Whitney in East Hartford is a very, very big plant. It's miles long. And they just walked off, the whole, I mean all the workers just, just left. And they were out for like three weeks.

JW: And that was right before you left?

PT: Oh, yeah, I, I never really cared for the place. Back then there was a lot of animosity between groups and things, I mean I was completely free of it, plus I was, we only worked three months in each place and so, um, I might have been in Hampstead and I might have been [unintelligible] Labs or any of those places there. I worked at a lot of laboratories there for, they had a lot of things there. And you learn, you just, they give you a job to do, you do it. You ask how and...

JW: When, when you were, you mentioned James Crossen earlier--

PT: Oh Jim Crossen, right.

JW: --as having, as having worked on the underwater camera--

PT: Right, right.

JW: --is that, is that a project that you were eventually involved in?

PT: Yes. We both did it.

JW: You came down to--

PT: Yeah, yeah.

JW: --the Center.

PT: Jim went to school when I, when I come here, Jim went six months of school in Chicago. So my responsibility was to get the vessel ready to go to sea, and get the people in the lab whatever they had to do there. There was only just the two of us, only two technicians there.

JW: Uh, so was this the first underwater camera that had been developed for this kind of use, or was it--

PT: Yeah it was a big--

JW: --building off of sort of an example?

PT: The camera was as big as that whole table right there.

JW: That's sizable.

PT: Oh, it, oh yeah, I mean, it's going to put that--

JW: How large was the lens on it?

PT: Um, well no, everything is in a big underwater housing, you know. It was the image off that got to, oh, if you ever saw, you ever been to a TV station when they first started TVs, if you saw the size of the cameras, and now this, ours, had to be waterproof, and big heavy cables go, going up. It just wasn't like a, a piece of co-ax or something there. The tremendous amount of wires went down to operate everything. It's not that way now, it's, it's fantastic what they've, the improvements that they've made there.

JW: So I guess it had to be lifted off the deck via--

PT: Oh definitely--

JW: --crane, and lowered into the water.

PT: --oh yeah, oh yeah, we didn't do it, the, the deck people did it, there, you know? We stayed away from that stuff, that's their job. That's, that's what their expertise, they'll, you're on land just tell them, be careful, be careful.

JW: And what was it used for, primarily?

PT: To look at fish entering the net. Take a look at the bottom, anything.

JW: It was pretty versatile?

PT: Yeah.

JW: Uh, so when, when using it for, um, looking at fish going into the net, I guess it would just be positioned ahead of the net.

PT: Yeah, positioned usually on top or, yeah, just the forward, you know? Or off to the side, if it's counting... I mean look, if it, but... and then it was on 16mm film, you recorded the, um, from the monitor, you recorded the film monitor, um, that was it. That's... but then when you saw the fish and you said, it was so clumsy and so difficult to work with, you got what you wanted, you didn't want to do it again, because you had enough problems with it. It was--

JW: Yeah.

PT: --it had problems with it all the time. Cables, you know, chafing, everything. When you're splicing cables together, takes a half a day.

JW: Was the data ever used by the Center, or was it sort of deemed--

PT: Oh no, no, they used--

JW: --unusable?

PT: --the data. No they took a look at it and saw what type of fish was going where, whether they were going above the nets or below the nets or avoiding, avoiding the nets. Oh yeah, no, that, that was taken a look at. The biologists were taking a look at it. As long, once we're free and clear and it's done, they have the films. We don't bother with them. We, we did our job, we're going to something else there. Yeah, that was... Yeah, we did a lot of underwater stuff, like, like the clam dredge, you know. A dredge clam, all clammers use a dredge and they tow it, and it got a blade that goes six, ten inches down into the bottom, and so, and they have a surface pump that pumps water down a big hose to a manifold and it, just like, clamming, instead of raking, you know, the water blows the stuff out of the way and picks up the clams and you've got jets blowing the silt and mud and, out the back end.

JW: Yup.

PT: And you're just keeping the, what you're interested in. So the, um, I, I worked a lot with the, with the clam dredge there. We put an electric motor on the dredge itself so

we just put a cable down, um, and the clam dredge has got three pieces of gear that go over, you've got a cable that you're going to haul the thing back with. You have a big piece of polyethylene all the way, and that, you want the clam dredge to surge in the bottom, okay, so the polypropylenes will stretch all the time and get through a point where it just pulls it through and stretch again, pull through, that's the way it works. And then you have the electrical cable for the motor, which pumps the water down. We could go in any depth with it where if you got a, a surface hose, you're pumping against the pressure that's down there, you know it's a half a PSI a foot, so if you're in a...

JW: How much force would that require eventually?

PT: Oh we, um, I can't remember what pressure we put on, but we had, we had, on the manifolds, we had pressure sensors there. And we knew just, we were constant pressure. We would try and keep constant pressure. And it worked, it's great. It's, but you had to be very careful doing it, plus we had 460 volts on that cable and it's, you got to be careful around it, you know. While working on the controllers or anything, you have to tell them hey look, we're not knocking off, everybody stop, get out of the way, you know, something's, something's wrong here, you know. And they do, they all, they all respected it.

JW: The danger of electrocution?

PT: Oh always, yeah, no matter what you're working on you're always... that's the first thing. Number one is juls, you got to remember that.

JW: Right, right.

PT: But everybody gets tickled, if you worked on the, with electricity long enough.

JW: How, how frequently was the clam dredge tested out when you were working on it?

PT: Well, we--

JW: I mean how many years of--

PT: --went out on surveys--

JW: --development did it undergo?

PT: We went out on surveys. The first surveys I went out because we had a lot of problems. Once the problem's solved, I'm no longer going out. And, um, once it's reliable, okay, but when you first start, we started in Gloucester with this thing here. And we had a lot of problems. We had a tremendous amount of problems. But then we'd solve the problem and we'd go to the next step. And when we brought the *Delaware* here, the *Delaware* was set up for clamming, you know, and it worked out quite, quite well for us there, you know. But any vessel you go on, and then some of the commercial fishers, fishermen, if they wanted to go to deep water they would, they would put a motor on there and we'd give them the, the data, and let them buy it locally, get a motor

and buy the cable, tell them where to buy the cable and, how to, how to hook it up. That's it.

JW: Did that dredge eventually become something that was mass-produced for purchase by members of the commercial fishing industry?

PT: Some people did, okay, and there was a fellow in Gloucester who made, no actually it was in Rockport, he made the dredges for us, yeah. You go to a manufacturer, any manufacturer, any welding shop or anything, you tell them what you want, you give them the design and that's it. They, they, and the fellows, fellow who, um, who was in charge of the clam port when we first started... Warren Rathjen. He come up from, he was head of the fisheries in Barbados and he come up and that's when we started that program. He come up to Gloucester out of Barbados, and that was our first clam trips. Keith Smith also. But it was left up to us to talk everything up and get it working. And just common sense and it works. But you've got to be careful. And Thomas Azarovitz which was the fellow here that was in charge of it, have you interviewed Tom yet?

JW: No, no.

PT: Okay.

JW: I've reached out to him by email.

PT: Right, yeah. I was with him last, Saturday night before last, we went to, a friend that I play golf with is the head of the curling rink here, you know?

JW: Oh, over by Highfield Hall?

PT: Uh, no, right, by Highfield.

JW: Yeah.

PT: And he, Tom curls and this fellow I play golf with, he's the, so he had a little party at his house so it was only three couples. And I hadn't seen Tom in a couple years now. He's very good, Tom was a good guy. Still is.

JW: Yeah, hopefully I'll be able to conduct an oral history with him at some point. Another person that I was trying to get in touch with recently is Mike Corbett.

PT: Oh yeah Mike goes, well Mike worked in Gloucester with us and then he come down here and then he left, but Mike was a mechanical engineer. There's a guy that you should get, is Al Blott. B-l-o-t-t. He started in Rhode Island, down Narragansett, I think he's probably still down there.

JW: Al Blott.

PT: Yup.

JW: Okay. All right, great.

PT: He, he really was the, well Corbett was also, both of them were, but Al worked for the, uh, Corbett, but Corbett worked for, I'm just trying to think of who the guy was in charge of the, um, I think it was Keith Smith, our Director, he ran that, uh, Keith's passed away, he's not here any longer. And the Assistant Director that was up there is not here, Ernie McRae, both of those fellows passed away. Um, in fact just about everybody's gone, for crying out loud.

JW: Now you mentioned before that you were working on long lining.

PT: Oh yeah we did, yeah.

JW: When you were in Gloucester too.

PT: Right, yeah we did long lining.

JW: What were the issues that you were looking at with long lining?

PT: Well the big thing was, um, you set out the long lines and you have to have positioning devices on them, you know, read out transponders and everything. That was it, and of course, um, long lining was easy because everything stayed mostly dry, they were on top of the, um, the buoys, okay? But when we do offshore lobster pots, we do the same thing. We put a light and a locator on them. Well, unfortunately, sometimes their fathometer wasn't read exactly right, you put the lobster pots over and you might have, just have a one and a half, one ratio to depth versus the amount of line, and or two, and somehow either tide was good, going the opposite way, and zip, there goes your thing down, they weren't watertight then that was the end of the light, so they--

JW: Oh, there goes the buoy.

PT: --the locators oh yeah, radar locators and everything, yeah. So you had to be careful, you know, you try to make everything as watertight as you could. But if it goes down more than thirty meters or so, you know, you're not figuring on that depth going down. You don't mind a splash or just being pulled under water, but when it goes down, that's the end of it there.

JW: So you were mostly trying to create something then to track long line gear?

PT: Oh right, oh yeah, definitely, right, definitely. Because you're setting it out in different places and then you're coming back--

JW: Yeah.

PT: --you know, the following morning or the, two days later or something, you know. And you have to notify everybody where you put this type of equipment because you don't want anybody running into it.

JW: Yeah, yeah.

PT: That was another thing, the radio telephones we had in those days were terrible. We had Boston Marine, New York Marine, and Norfolk Marine. They were the three stations that we could talk to. We had our own telephone in the lab, but the marine operators were a lot more accurate. And so if you had to communicate with anybody, you had to go through the marine operator. And sometimes our telephones didn't work that well. They were, it's a low, it was a low frequency, you know, it was only two megs at the time so I mean, the range was very limited. But when they put that satellite up there, bango, what a difference, that changed the whole system. It changed everything. Because you can do anything you want with a satellite.

JW: Much longer ranger?

PT: Yeah. I worked, when we were doing the data logger, we worked down in Bay St. Louis with a NASA group there. In fact, NASA was pulling out of Bay St. Louis at the time, so a lot of the workers, Ornetics, General Electric, North American, there were three main companies down there, they had all these engineers and they were just looking for a job, you know, this was great, we just found them at the right time. They helped us quite a bit.

JW: When you wound up coming back to Woods Hole in 1970, what did that mean for you in terms of a change in your, your work?

PT: Just meant more work. [laughs] Because they moved the whole lab down, they moved our lab from Gloucester down here, so we did our lab work and then I also did Woods Hole's lab work.

JW: Okay. You were still working with Exploratory Fisheries down here, then?

PT: Right, well they were--

JW: Just a change of…

PT: --they were absorbed by this, the government downsize, supposedly. And we just became part of them there. Which worked out great for us, you know. More money.

JW: Now was Exploratory Fisheries, is, was that the title of the group that you were working with?

PT: Yeah.

JW: Okay. I just want to make sure I have it correct.

PT: You're right, yeah.

JW: So that I'm not assigning it some different name here.

PT: No. We just called it, the nickname was the Gear Base, you know, because we had a lot of gear there. And if you wanted, like, your nets or anything measured, you'd send

the net up and then we'd measure it for you and give you the measurements and go back with it there. In fact one time, Marv Grosslein, he was a biologist here...

JW: I just interviewed him the other day

PT: Oh great guy. And Marv, they wanted to compare the old manila nets to the poly nets there, okay? So he sent up, the 36 is a net that they, the fisheries, they used for years here. And it was a small net.

JW: What did 36 mean in terms of its' dimensions?

PT: 36 was just the, the 36 net is, it's the design itself. It comes with a number, okay? And although they were manila nets, the net was made exactly the same parameters, okay, that was the 36. And then they switched over to the 41, which was a little bit bigger because the fish got scarcer so they had to sample more fish. Well, he sent up this manila net up to Gloucester for us to measure and here they use, the new ones use rubber rollers, big rollers on the... have you ever been out to sea?

JW: The roller gear on the bottom?

PT: Right, okay.

JW: Yeah.

PT: Well, these were, like you take a log, okay, a twelve or a sixteen inch log and you put a hole through oak, okay, and it's six inches wide, okay, so those were the rollers. And for them to get weight, okay, you put them in deep water first, they go down a hundred fathoms or whatever you want, and then they were, they were, they were penetrated there.

JW: They'd absorb water?

PT: Yeah. So now he sent those, the rollers and everything up, so we went out and we measured the net. And the net measured the same as the 36, you know, it wasn't that much different, you know. And we towed it under different wire lengths and different speeds and everything. So I called Marv and I said, Marv, what do you want us to do with this manila net, because I don't, we don't have that big an area to store all our stuff. He says, oh you guys, do whatever you want to do with it. So this Warren Rathjen, I told you, he, he, when he come back to Gloucester, he, um, he had an apartment right across from the lab there, across the water. And he had a Franklin type stove, so we burned those things... and if you get a piece of water that's been waterlogged and is dried out, you know, it has all these salt crystals in it, it burned beautiful in the stove. [laughs] We'd always go down the street, four of us would go down to his, after we got through work, we'd get a bottle of wine or something, we'd sit there and watch, watch the flames. That's what, that's what happened to that, to that net, that we didn't do anything with the manila, I don't know what they did, they probably just threw it in the dump there. But we burned those, uh, the rollers. That's what we were interested in.

JW: I, I've heard, in other oral histories, about the use of, you know, wooden, you know, tree segments, for rollers...

PT: Right, yeah, that's it, that was it.

JW: When did that go out of, uh, out of practice?
PT: Long before I got here.

JW: I was going to say, because that's a pretty old--

PT: Well--

JW: --design.

PT: Well, when did nylon, when did they start using nylon?

JW: It was like, nylon dacron, right after the war, right?

PT: Yeah, well, I mean, you know, industry might take it over, but the fishing industry, don't forget, they're primitive, the fishermen were primitive.

JW: Right, it's always behind. Always catching up.

PT: Yeah, and if you got a piece of gear, you're not going to spend, I don't know, X amount of dollars for--

JW: Yup.

PT: --something you're not that familiar with, so I was up there and I'd never saw, with the *Albatross*, I'd never saw a, um, a manila net. They were always nylon and rubber rollers. We, the first ones, first ones, it was these big steel rollers on the *Albatross*. Oh my good God, they were terrible. Big, round, steel things that come over the side, good God, it sounded like the third World War. [laughs]

JW: What, what was the, why were they using steel and not rubber?

PT: Um, that was, who designed, first of all, it was the first stern trawler in the country, the *Albatross*. So it, and plus, it didn't have...

JW: You mean a western rigged trawler?

PT: No, it was, everything was side trawler before, they took everything over the side before.

JW: Right.

PT: Okay, so they, first stern trawler was the *Albatross*. And it had a gantry that moved back and forth, you know, on the aft deck. And, um, it didn't have a rudder, it has a kort nozzle just like a tugboat. All of these were innovations, the *Albatross* was really an

advanced vessel for the time, and Arthur Posgay was a biologist in charge of everything, and he did a great job. But when you're doing something for the first time, you make mistakes. Everybody used to come down, I used to think, this guy did so much for the fisheries, jeez, you know, and he was just a biologist, you know, I mean, but he, he was in the military and I think he was in the Army Air Corps and he was a common-sense type of guy, so he went along with the, Potter was the designer, they were out of Boston, and they designed the vessel, and they did a, I mean, it was a completely different vessel. Steel down below and aluminum up above, and we had anti-roll tanks, I took care of that right away. The Captain, Captain Betteay, he was afraid of the, you know, and the...

JW: What, what were they?

PT: The anti-roll tanks they had in the vessel, when we first just to go, the vessel used to snap or you'd go to put your foot down and it was, you want a vessel that's quick, okay, you don't want a slow rolling vessel because it'll, if it's, if it's slow roll then it's laying there, it doesn't have any force to come back. So they did away with the anti-roll tanks, that was one of the first things we did away with. The, but the Captain when on that, he beat the lab, he said, I'm not taking that vessel to sea, I'm calling the American Bureau of Shipping and they come down, and we went out when the, oh we were coming back from the trip, and they come out and they, and everybody there with a stopwatch, and they measure the roll, you know. And they said, seal up the tanks. You know, all it is, it's just a valve in between the, lets the water... A simple thing, but in a luxury liner they work great. But...

JW: So this was right after the *Albatross IV* had gotten--

PT: Oh, yeah.

JW: --to Woods Hole--

PT: --oh, yeah, yeah, I'd say about six months after. When we were out, the, the vessel rolled, I mean, if you use the anti-roll tanks, the vessel rolls slow, you know. It's great if you're, if you're on a cruise. But if you're in rough weather, you don't want a, you don't want a vessel that's going to roll, you know, I mean, you'll want it to snap--

JW: Don't want to destabilize it.

PT: --come back, yeah, quick, like a destroyer, or, you know, if you've ever been on one of them, they, they move. The, so, they come out on the vessel and they come onside and they did all the testing for an afternoon and then they made their report and they close up, seal up the tanks. It worked. But Art Posgay went along with, I mean, he was against sealing up the anti-roll tanks there, but that was, he had a tremendous amount of ideas, you know. We had, like the vessel was steel but from the waterline up, it's all aluminum. It was just a completely different type of vessel, you know.

JW: Was that just to make it less top-heavy or was there another, other reasons why that?

PT: I honestly, I honestly don't know why but it worked out well. If you keep the weight down below, you're all set, you know. But it's, it was a higher vessel than any of the vessels around, you know, we had more decks and everything. We had TVs all over the place, it was a pain in the neck, you have to climb up the forward mast, climb the aft crossbeam there, the TV would go out, oh jeez.

JW: Doing that in rough weather?

PT: Yeah. TVs in those days, I mean they were, you know, they were terrible, they really were. Now, God, they, got a camera as big as that there that'll record for four days.

JW: What was the TV reception like at sea?

PT: Oh, you don't, in fact, I just talked with Fred Nitzche that's another guy you want to interview, he's here in town.

JW: He was the Chief Scientist aboard the...

PT: Oh yeah, he was the Chief Scientist...

JW: ...*Albatross IV*, right?

PT: ...oh yeah, for a lot. Just talk with him because they want to go out to eat, all of them. The, um, my colleague there, the golfer, oh yeah, we'll, get us together...

JW: Well, if you see him, tell him that he should do an interview.

PT: I will, okay? But, um, we were going into Boston Harbor, and we're going to the shipyard, Monroe Shipyard, and they were picking us up to, bringing us back to Woods Hole, so all of a sudden the TV wasn't working. That's the only place we really got it was when we were close to land, and he said, the TV's not working, you know. So I took a look at it, he said, let me go take a look, see if the antenna's still up there. And when I'm walking up, you know, just coming to the port, I said look, and I saw the lights going out, and it was that blackout that we had so we stopped right away because our Captain Betteay used to use the RDF to go into any port, you know. And because they all had, they got a beacon, and he's howling at me, the Lorans are out, and the RDFs out I think, hey Captain, I'll take a look at it in a minute. And I'm looking and I said, hey, everything's black out there. We had that big blackout there, that was in... I could ask Fred, I just asked him, I saw the date in the paper... It had to be in like '68. No, before that.

JW: What port were you coming into?

PT: '67. '67 it was there. It was in August of, I mean, July of '67. And we were, so we stopped right there, we stopped and we went into the grays and we anchored until daylight and then we went in, in the light, without any navigation. But they had that major blackout in all of New England. All of the Northeast, it was a tremendous blackout. And it was started, I think it started in Canada and it just... transgressed right down to the, well as far as New Jersey, I think. I don't know how far down, I, I'm almost, I know New York went out, but... Um, we were out for, um, I know we drove back and

they still had the blackout on. Uh, they sent cars up to pick us up. Because that's what they were doing anyway. And we were going that, that evening, so it didn't make any difference, we would've stayed that, that night on the vessel but anyway, they sent the cars up after us there. But that was a classic, Fred Nitzche's hollering at me, there's no TV! He was the Chief Scientist there. I said, well, let me go take a look. He'll, he'll tell you that. I said, cool it. [laughs] Because you really don't get to see, then, we really didn't get, well you remember the... How old are you?
JW: 30.

PT: Oh, no, you wouldn't remember back then. Holy cow. There was no such thing as a remote or anything for a TV. Change, you had to get up and change the channels.

JW: I remember the three stations, you know. [laughs]

PT: Oh yeah, oh yeah. Well, my wife's grandmother was Polish and she didn't speak any English whatsoever, and she used, every one of the children would take her for like three months, you know, and um, she was a son of a gun. She didn't even understand the TV or anything, but if the program ended and you got up to change the channel, she started hollering at you. I never knew what she said, I mean I understand a little bit of Polish, but she used to holler at me there, she'd call me Stanley. Stasiu! And she'd holler and I'd know that, okay, all right, go ahead, we'll leave the ads come on and just [laughs]

JW: So how often did you sail aboard the *Albatross IV*?

PT: Well, when we first got it going, every, I'd be out 14 days every, every month.

JW: And this was on top of the--

PT: All the lab work and everything--

JW: --the gear research that you were also doing.

PT: --oh yeah, yeah, if you weren't, if you weren't out at sea then you worked whatever anybody needed there.

JW: How'd you divide your time, pretty much then?

PT: You were busy when you went to sea because I also, I served on the CTDs and all that stuff there. If there was an electronic instrument, I ran it also. Yeah, I mean they paid us overtime which was fantastic. They weren't going to pay us, but they decided that, see some of the guys that, in fact I'm just, I just put it, the guy that was the Chief Scientist himself and three other biologists...

JW: You mean Fred?

PT: Uh, no, I don't think... Fred might have been involved in that, they went to Boston, complained to the Civil Service Commission about how they were spending so many hours at sea and not being paid just eight hours a day, you know. So, um, I'm going, this guy who just passed away in Rhode Island, I'm going down in September to his, um, he

was a Chief Scientist here in Woods Hole for a long while. Then he moved to Rhode Island. And he went to work for, I mean, still a government employee, but he went to work for AFO, and, I don't know who else, but he was always a part, he just passed away.

JW: What was his name?

PT: Bob Merrick. A very good guy. Excellent. In fact, him and Dave Miller made the high speed Miller sampler. Both of them were good biologists and really knew their stuff there, you know. Yeah, Dave Miller. He passed away also and Bob just passed away. Good God. When I start to think of it, the only ones left at the lab are Nitzche, Crossen, Wigley, have you interviewed Wigley yet? Roland Wigley?

JW: Hopefully soon.

PT: Okay, good.

JW: Yup.

PT: I, uh, he was benthos.

JW: Working on invertebrates?

PT: He, yeah, he headed up that group. Very knowledgeable guy, excellent guy. Um, I don't know of anyone left other than them there, when we first... When we, when I come, the aquarium wasn't finished yet. And they were just putting all the displays in and everything. And the lab, there wasn't many people in the lab. And we had, where the maintenance building is, the whole upstairs, we had the whole, well, of course it wasn't built on, it was just a... empty place up there and that's...

JW: Where was that, exactly?

PT: It was, um, as you went up the stairs, it was just one big, big room. It, they called, it, it was going to be a gear room, that's what it originally was so they could do gear, but they never did anything like that. They stored all the stuff from the old building, the old lab building, they stored up there. We had the lab down the end. And the only person with us was the fellow who was doing the aquarium work, Frank Bailey who was an artist, he was making all the models for fish and he did a fantastic job, a great painter too. And, um, they didn't, and then when they went to redo that lab, they sent Jim and myself and Frank Bailey, they sent us all to the little white house, you know where they...

JW: Where's that?

PT: Right next to the, right next to the ramp that goes down into the water, you know like if you took the...

JW: Next to the aquarium?

PT: Yes.

JW: Yup.

PT: Next to the aquarium. That was, I lived there when I first come here, in that house there. It was a residence.

JW: Oh the one right on the other side of the ramp?

PT: Yes, right on the other side of the ramp.

JW: Okay.

PT: That was, that was a residence house there. And, um, the, uh, and that originally was the Director's residence there. But the Director bought a home in Woods Hole, so he didn't live there any longer. A nice place. And then they moved us in, and we, uh, and we had that for a year or so, we worked out, out of that building. It was great, it was, you know, really, really good there. It was just the three of us there.

JW: So that building actually served as the office then?

PT: Oh yeah, that was the, yeah, and then when we left, um, Nitzche's group took it over. The scale readers and, and that group.

JW: Age and Growth?

PT: Age and Growth, yup. And, um, jeez, see, I forgot those names there, you know when you're out of the place for twenty something years, you know. Um, like that Barbara, down, down below. You, that's the hard part about it, I don't know it whether it was age does it or what. You forget names, you know. I know Josh, okay, but the, if you haven't seen the person like, we go to Florida in the, in the winter. I come and, I belong to a private golf course there. And the, if I haven't seen those people in six months, when they come up me and they say, hey Pat, you know, you say, oh yeah, great, great, great, and you turn to the, you turn to the guy that's sitting next to you, you say, what's his name, what's his name? I don't know![laughs] And Crossen, he relies on me all the time, you know, because he cannot think of anybody's name now. And he used to be great with names. Jim should've been a salesman, because he could, he could remember everybody's name, but now he's, no. Um, I'm just thinking of, who is left around here. You get a hold of Blott. Blott will fill you in a lot on Gloucester.

JW: So did Al Blott work, he worked with you in Exploratory Fisheries, then?

PT: Yes, he was--

JW: Okay.

PT: --he, um, him and Corbett both worked, they come into Gloucester just before we come down here.

JW: Yup.

PT: Um, yeah, in fact the people that come down, when we, uh, when we come back here, was Keith Smith, he was the Director, Ernie McRae, he was the sub-Director, um, just trying to think of the biologists that come down. I don't think any of the biologists come down, I think they all... Oh, wait a minute, Rathjen come down. Um, Warren Rathjen come down. Uh, I don't know of anyone else. A lot of the people just said no, you know, we're not going, or they transferred to some other place. Uh, Blott and, uh, Corbett come down. And Rathjen left and he went down to Barbados, that's where he went down, or did he just come back from... I don't know which one.

JW: How do you spell his last name?

PT: R-a-t-h-j-e-n, I think it is. Rathjen.

JW: Okay.

PT: Warren Rathjen. And, um, no, he was, he was down there, and he come back to Gloucester, and another guy went down, oh jeez, he was the, he was a marine engineer, a biologist but a marine engineer, and, uh, he was a commander in the reserves and a ship repair place there. Oh my good God, jeez and I was with him a lot, in fact when we built the *Delaware*, he and I traveled up to South Portland... Um, when we built the *Delaware,* we were going back and forth all the time, it was built in South Portland. Um, Bob, I can't think of his last name now. He was great, he come back here, he come back from Barbados and he come here. He was really good. He was, uh, he was in charge of building the, uh, *David Starr Jordan* also.

JW: Was that another research vessel?

PT: Yes, that was out in the West Coast--

JW: Okay.

PT: --and out on the West Coast, he was out there for that. He was good, he was good, a good gear person, you know, equipment type of guy. He really was great, you know. Biology, he wasn't a, he was a graduate biologist, but not, I don't think he ever worked in the biology thing. He always with the, was with ships, vessels, some type. Um, oh my God, I can't think of his name. Jesus. Remember I told you about the names? Um, if I think of it, I'll... I will think of it, you know.

JW: Yeah.

PT: I mean this guy here was a, I mean we worked a lot together there. We did the whole *Delaware*. That's, we were the only two that were responsible for the *Delaware*. We were the government reps for the, yeah.

JW: How often did you sail on the *Delaware*?

PT: A lot. When we first got it, we did everything. We did all the installation and everything, you know. Because...

JW: So you were really everywhere.

PT: That's right. Yeah I did, well, I didn't mind it, I didn't mind it. As long as I had something to do, great, you know. I couldn't stand not doing something, you know. Oh my God, it's a common name too. Oh jeez, this is going to drive me nuts. I'll think of it on the way home. I remember one time--

JW: Don't try to remember it, it'll come to you.

PT: --we were down to this A.C. Boyer. Oh he's here, A.C. Boyer is there. He come from, uh, I don't think he'll, I don't think he'll, he'll interview. He, he might though. If you can get him. He come out of Boothbay lab and, um, he had the lobster program. And then he was, uh, Cruise Coordinator down in Woods Hole. Oh my God, you've got to get this guy Bob something there. But he's down in, because he invited me... because Azarovitz and I were down in Charleston, South Carolina working, and Bob called me on the telephone, he's only, like about five miles away and wanted me to go out night fishing with him there. He really is a nice guy. Oh Jesus. And I was with him a lot, you know. *Delaware* was built twice. What happened was that the first *Delaware*, they built it in a dry dock and they couldn't get it into the water so they lit it on fire. And they built another *Delaware*.

JW: I heard about that, yeah.

PT: Yeah it's the truth. We were there for that, there. We were glad that the--

JW: Why'd they light it on fire, was there no other way to--

PT: No other way to get it to the water. I mean, it was, this was South Portland shipyard. Plus, they beat the government and they, um, they sued the government for things they didn't know, we'd write up a gate sheet on it on the vessel, and they'd take it and they wouldn't do anything there. That's why I said, we worked a lot on the, on the, on the *Delaware*, getting things going.

JW: And was the *Delaware* only doing clam surveys?

PT: No, it did all research there.

JW: Okay.

PT: It did groundfish surveys, it did, in fact they tied up the *Albatross* when they brought the *Delaware* here. Well, the *Delaware* went down, when we left Gloucester the *Delaware* went down to New Jersey, and then they brought it back and they tied up the *Albatross*, and that was the main research...

JW: So that was 1970 that it went down to New Jersey?

PT: Yes, it was, yes. And it was down there for, um, well when Azarovitz and all those guys come up from New Jersey that was probably '72 or '73,

JW: Okay.

PT: Um, the *Delaware* come up. And then it did the groundfish surveys; they tied up the *Albatross* for awhile. And we had, a crazy history of this place when you get to thinking about it, there. Jeez, I can't remember Bob's name, and he'd be great, great interviewer, he's pleasant and he's got, he, he knows so much about the place.

JW: What was his position again?

PT: He was, um, in, in Gloucester. He was the government rep for construction of the *Delaware*. And when he come back to Woods Hole, he worked for the, again he worked for us, he was tied to NOAA, the NOAA Corps, you know what I mean? Getting them to take over the vessels, which was the best thing ever, wow. Oh my... don't worry I'll think of his name.

JW: It'll come to you.

PT: Oh, I mean, we were close, we went to--

JW: Yeah.

PT: --we, we traveled a lot together.

JW: Yeah.

PT: Yeah, he retired and went down to, uh, South Carolina. Oh my good God.

JW: Well, so going back here for a second now, do you remember why, what was, what was Marv testing when he sent you the manila net?

PT: Oh he was in charge of groundfish survey--

JW: To test against the--

PT: --groundfish survey. He was in charge of groundfish survey, so groundfish survey has to know what the opening of the, of the net is, and he wanted to take a look at the old net compared to the new net.

JW: Okay.

PT: Although the parameters were supposed to be the same, he wanted them measured, and we did.

JW: So they'd actually been using the manila net with the tree, tree trunk slices..

PT: Before.

JW: Before this survey.

PT: Oh, yeah, well they did the surveys with the old *Albatross III*, you know, um, and the old *Delaware*, you know, they did surveys with them.

JW: And that was using this antique gear?

PT: I wasn't here for that then, so I, I mean they had to use manila nets at one time--

JW: Right, because that was, you know...

PT: --because that's why he sent it up there. That was the nets, you know. Um, yeah, oh, Grosslein, yeah, Grosslein was in charge of groundfish survey. So he was the one that was, uh, oh my God I can't think of Bob's name, it's going to drive me crazy. Um, uh, don't worry, I'll think of it and I'll give you a call and you'll want to contact him. Um, do you have the, addresses of all the old fisheries people?

JW: I, I do actually, yeah, it's the document that Linda has.

PT: Right, yeah.

JW: Yup.

PT: Do you have it?

JW: Yeah.

PT: He's on it.

JW: It's on the computer downstairs.

PT: Okay.

JW: We can, when we leave we can stop downstairs and

PT: Okay, all right, yeah. He's on that there. He's, um, I'll recognize it there. But that's about it, I don't have anything else.

JW: All right, great, great, well thanks very much for...

PT: Oh no.

JW: ...coming in and sharing your memories, Pat, this is, this is really interesting to hear about some of these gear developments.

PT: Oh, yeah, well, yeah...

JW: There was a lot going on there.

PT: It was. I mean, we were always busy. I remember one time we got this brainy idea, this is Bob Bruce and myself, we used to have our transducers mounted on boards and the boards get waterlogged and they, and they, one transducer's here and the other one's here, and it would measure the horizontal opening of the net. And we'd use another one over the top to ping off the bottom. And this is how we measured the parameters of the net. And I said, these ridiculous, wooden boards, for crying out loud there, what I'll do, is I'll get a form made and we'll take some high-density, this, this little glass balls of high-density foam and we'll put the transducer in that, and that way they won't weigh anything in the water. I'll figure out, we'll measure it and we'll balance everything out so it doesn't weigh anything; it's not going to change the net, you know.

So we go out to this place in Watertown, Mass, and we get two five-gallon drums of this high-density foam. And the guy gave us two pint cans of the accelerator. We figure, well, it must be a pint can for each five-gallon drum. So we took, there's a, engines they used to use on the vessel, they're 671 GMs, and they're, so, used to come in a big wooden case. And you, he, we get the instructions from the guy up there, he said just make sure you got heat lamps and everything, get everything heated up first, you know, and we put clips on the, these little clips so we could, we could make quite a few of them, you know, because you lose them sometimes if the net is tangled up or something. I said, Bob, I said, we're all set. And we go over to the maintenance shop in Gloucester, and he said, how do you think we should mix it? I said, I don't know. He gave us, so one, one pint can for a five-gallon can, I guess that's what we do, you know.

So we pour this stuff in, and first of all we got the heat lamps, you know, shining in the thing, got everything hot, and we pour the foam in and take a pint can, and the thing started to grow and grow and grow. So we took the cover...

JW: [laughs]

PT: Oh no, it wasn't funny. We took the cover, we tried, and we're doing this at night, like 8:00 at night, that's when we used to do a lot of the things, you know. And Bob Bruce was this guy's name. We tried to put the cover, but then the cover came right off and it grew, then it come out on the floor, then he had some drill presses there, it covered the bottom of the drill presses, we said, we get the hell out of there, quick, you know. So we come in the next morning and the maintenance guy comes up to me, says, what the hell did you guys do? And I said, Bob, I mean, Bill was his name, it was Bill, he said, we had an accident there. We messed up with this foam stuff there. He said, how'd you mess it up? I said we put a pint... Oh Jesus, you can't do that! He said, no. I said, we know it now, you know. But we lost everything. My, we couldn't get it. He says, a fire ax won't even chop that stuff up there.

JW: Really, wow.

PT: He did, he got it out. But it was, I tell you it was all like here...

JW: How much equipment did you lose?

PT: We didn't, we just lost my stuff, my transducers and the two nice aluminum frames that I had made, where I had, they were very hydrodynamic and everything, there would be no drag and everything, but we learned our lesson on that one there, you know. Get better directions. We just were up to Watertown, we bought this stuff, we saw it, I saw it in one of the, um, oh it's little glass beads in there, so I mean, it adds to the flotation, you know. And plus they're round cylinders so they can take a tremendous amount of pressure, you know, it's equal all the way around.

JW: So you would've stuck the transducer into the foam piece--

PT: Yeah I had a hole in there, slipped the transducer right in there--

JW: --and that would go on either side of the net and then on the top and bottom.

PT: Yeah, right, yeah.

JW: Okay.

PT: And then we'd take a wire and we'd run them right along the top of the net--

JW: Yeah.

PT: --to connect them all together and then a wire going back to the, uh, we had a constant tension winch with slip rings on it so we get the signal all the time.

JW: Now after the foam fiasco it succeeded, I guess, right?

PT: Oh, it would've been great, oh we did make them after.

JW: Okay.

PT: Oh yeah, oh, we made them, but you should've seen.

JW: That's what I was wondering about, did it stop there--

PT: Oh the mess!

JW: --or did you continue to?

PT: No, no, I had a... Bob Wolf. Bob Wolf is that guy's name.

JW: Okay.

PT: Okay? But I... Because he asked me about it, he said, Pat, how will the things go on, I said, I don't know, why, don't ask, you know. I never told, we never told anybody but Keith Smith, our boss, said what the Christ happened? He says, I saw Bill, they tried to take it out and he had a, called in for a, um, one of those things they drop the garbage in, and he chopped up all the stuff and used an electric saw and an axe and everything to get it up.

JW: Oh really?

PT: We offered to help, he said, nope, keep away from me, keep away from me, he said. [laughs] In fact, we, when they got the *Gloria Michelle*, you know about the *Gloria Michelle*?

JW: No.

PT: Okay. The Gloria Michelle was a, uh, dope vessel that they caught coming into the country, and Jack Moakley, are you familiar with Jack?

JW:I know him by, I know his name.

PT: Yeah, okay. Well, Jack had just, had just, a NOAA Corps officer, brand new, that was his first command was the Gloria Michelle. And we went out to do the Nantucket Shoal experiment and I was the only guy from the lab on the boat, and what they did, they had a NASA airplane would fly over and I'd take salinity, conductivity, I'd take maybe six measurements of the water and they would fly over, they'd ask me what I got and they had, supposedly, their visual sensors up on there. And they were supposed to be getting the same readings I'd get, or got, okay? And we did it for five days and the shoals, I mean you get beat to living hell out there, I mean ,it's tough weather, plus I mean, you're trying to lower instruments into the water, you're holding on, um, they had, Al Blott was aboard the boat, and Jack Moakley was the Captain, and we go into Nantucket every, every night. So they took, asked us to go look at the airplane, you know, the NOAA airplane, and it's at the airport in Nantucket. Beautiful airplane, you know. And they guy's explaining to us, this is what, this is the readings you got and this is the readings, oh, okay, good, and we were okay. But every time, you can't be that accurate every time, you agree with what they're saying, so after the, you got to ask Jack or Blott. After about the fifth or sixth day, I said, I'm going to test these guys here. So... when they call, what are your readings, I say, I'm having a problem. I said, can you give me your readings so I can calibrate my instruments there? And they said, hey, believe it or not, we're down right now. I said to Moakley, let's go in. I took the ferry back to Hyannis and my wife picked me up, I said, that's bullshit. I said... You know, theirs was experimental, you know, we're getting the living hell beat out of us, but the *Gloria Michelle* had just come out, we didn't have a table to eat on, but they cut a hole for the porthole, we took that , we put it down, put two stanchions under, made a table out of it. Oh, the *Gloria Michelle* was, oh yeah, but that was Jack's first, um...

JW: Is that vessel still in service?

PT: The *Gloria Michelle*, yeah, I think it's, uh, it was, it went to New Jersey after the *Delaware* left, it went down there. Um, I don't know, ask Blott, he was the one that, uh, had a lot to do with the *Gloria Michelle* after. I, that was my contribution to the *Gloria Michelle*. When I saw the piece come from the porthole like that, I said, hey, let's take that, we'll just take two stanchions, weld them to the floor, there, we, we got a table to eat off of. Oh it was a, it was a, wooden bunks, you know, that somebody just put up quick. I think Blott did that. You know, there was I think four of us aboard the vessel and I did a lot of things like that there. But, you know, if you've done them and you've been

around, you know, sometimes it's a load of bullshit they're giving you, you know. Oh yeah, you're right on, you're right on. You can't be right on... Look at us, some stupid old instrument.

But that *Gloria Michelle*, yeah, that was Jack's first, then he took, he was captain of the *Albatross*. Now he's works down there, he's the, uh, sub Director or whatever the hell he is there, I don't know what his title is. He had a, my daughter goes around with his wife, they started kindergarten together, they still go around, they're very close friends. Yeah, Jesus. I see Jack every, quite often, because he's with her, he picks her up, my daughter and his wife, and he, he has a boat in Woods Hole also, he has a boat out in the harbor. His uncle was a U.S. Congressman, Moakley, the building, the big building in Boston is named after him there, Joe Moakley. And Jack got his law degree out of Howard University down at, when he was working down in Washington there. It helps to have a Congressman as an uncle. Where are you from, Josh?

JW: Uh, upstate New York, near Albany.

PT: Near Albany?

JW: Yup. Yup.

PT: This is better weather than Albany.

JW: It gets as hot and as humid up in Albany.

PT: Oh I know...

JW: I can't complain, I guess.

PT: The, um...

JW: It'd be just as bad up there.

PT: I remember one time going up to Lake Placid, doing the Olympic tryouts...

JW: I'm going to, I'm going to shut this off here.

PT: Oh, please do, oh my good…